

**REMARKS**

**I. Status of Claims**

After entry of this amendment, claims 1, 3, 4, 8-13, and 16-20 are pending.

Claim 1 is amended herein, and claims 7, 14, 15, 19 and 20 are cancelled. Claims 2, 5 and 6 were cancelled in a previously filed amendment. Support for the present amendment to claim 1 can be found throughout the application, including, for example, paragraphs [0031]-[0033], and [0044]-[0046] of the published application (U.S. Patent Application Publication No. 2006/0234241), and the original claims.

Applicants respectfully request that this Amendment under 37 C.F.R. § 1.116 be entered by the Office, placing the elected claims in a condition for allowance.

Applicants submit that the proposed amendment to claim 1 does not raise new issues or necessitate the undertaking of any additional search of the art by the Office, since all of the elements and their relationships claimed were either earlier claimed or inherent in the claims as examined. Therefore, this Amendment should allow for immediate action by the Office.

Finally, Applicants submits that entry of the amendments would place the application in better form for appeal, should the Office continue to dispute the patentability of the pending claims.

**II. Examiner interview**

Applicants thank Examiner Forman for availability and useful discussion during a telephonic interview with their former representative, Laurence A. Shumway, on July 9, 2010. No exhibits were presented or discussed. All claims were discussed

generally. The participants discussed the advantage of a dust free surface using trialkyl halogenosilanes to treat substrates such as glass or quartz. In addition, participants discussed the advantage of devices comprising a microchannel formed in the connecting surface by groove part(s) with a protruding part capable of controlled movement, relative to bead size. No final agreement was reached.

### **III. Objections to the claims**

The Examiner notes that if claims 14 and 15 are found allowable, claims 19 and 20 will be objected to under 37 C.F.R. § 1.75 as being a substantial duplicate thereof. Without conceding that this objection has any merit, and for the sole purpose of advancing prosecution, Applicants have canceled claims 19 and 20 and respectfully request the withdrawal of this objection.

### **IV. Rejection under § 112**

Claim 18 stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, the Office alleges that the claim contains subject matter which was not described in such a way as to convey to the skilled artisan, at the time of filing, that the inventors were in possession of the invention. Office Action at p. 3. Applicants traverse.

Applicants direct the Office's attention to paragraph [0029] and Figure 4 of the published application, showing that a protruding part may be provided in the substrate itself, thereby defining a gap part having a fixed sectional size. This paragraph and figure convey to the skilled artisan that the inventors were in possession of the subject

matter of claim 18 at the time of filing. Accordingly, Applicants respectfully request the withdrawal of this rejection.

**V. Rejections under § 102(b)**

Claims 1, 3-4, 7, 16, and 17 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by International Publication No. WO 02/40874 by Quake *et al.* (*Quake*). According to the Office, *Quake* discloses a first substrate and a second substrate connected to the first substrate defining a connection surface, wherein the substrates are grooved forming a channel and wherein the grooves have projections forming a gap, wherein the gap is variable by moving the projections, and wherein the gap is configured to block beads of a size greater than the gap. Office Action at 4. The Examiner also cites to portions of *Quake* that allegedly disclose the features of claims 3, 4, and 7. Applicants traverse for at least the following reasons.

Anticipation requires that a single reference teach every limitation of a claim. M.P.E.P. § 2131; *see also Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) ("A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."). *Quake* does not teach all elements of claim 1, from which the remaining rejected claims depend. For example, *Quake* does not disclose a microchannel having an inner wall surface decorated with triethylchlorosilane, as recited in claim 1. Accordingly, Applicants respectfully request withdrawal of this rejection.

## VI. Rejections under § 103

### A. Quake, in view of Lough or Smith

Claims 8-12 stand rejected over *Quake* in view of U.S. Patent No. 5,900,481 to *Lough et al. (Lough)* or U.S. Patent No. 6,270,970 to *Smith et al. (Smith)*. The Examiner relies on *Quake* as described in the rejection under 35 U.S.C. § 102(b), above, and acknowledges that “*Quake* is silent regarding the size, structure, or composition of the beads.” Office Action at 5. These deficiencies are allegedly remedied by *Lough* or *Smith*. In particular, the Examiner alleges that the skilled artisan would be motivated to combine *Lough* with *Quake* “based on the preferred differential immobilization of *Lough* (Abstract).” *Id.* at page 6. The Examiner further alleges that the skilled artisan would be motivated to apply the chaotropic salts of *Smith* to the device of *Quake* “for the expected benefit of providing unfolded nucleic acids that are more thermodynamically stable...[to] favor hybrid formation.” *Id.* Applicants traverse for at least the following reasons.

When asserting an obviousness rejection, the Examiner must base the rejection on the claims as a whole, considering all claim features. See M.P.E.P. §§ 2141.02 (I) and 2143.03. As described above, *Quake* fails to disclose each and every limitation of amended claim 1. In particular, *Quake* fails to disclose a microchannel having an inner wall surface decorated with triethylchlorosilane, as recited in claim 1. Neither *Lough* nor *Smith* remedy this failing of *Quake*. Accordingly, Applicants respectfully request the withdrawal of this rejection.

B. *Zenhausern* in view of *Quake* and *Lough* or *Smith*

Claims 1, 3-4, 7, and 16-18 stand rejected under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent Application Publication No. 2004/0011650 by *Zenhausern et al.* (*Zenhausern*) in view of *Quake*. Office Action at 6. According to the Office, *Zenhausern* describes a microchip with a microchannel containing a moveable array of constrictions formed in a substrate. The Office acknowledges, however, that *Zenhausern* “does not specifically teach a channel formed between two grooved substrates...[or] a size of the particle relative to the constriction.” *Id.* at 7. The Examiner cites to *Quake* to remedy these deficiencies, alleging that *Quake* describes one of “the variety of known techniques to construct the channels.” *Id.* The Examiner further alleges that the skilled artisan would be motivated to combine these references, based on “the benefit of facilitating retention and analysis of analytes on the particles as taught by *Quake*”—although the Examiner offers no explanation for *why* this supposed benefit disclosed in *Quake* is relevant to the noted deficiency of *Zenhausern*, *i.e.*, *Zenhausern*’s failure to describe a microchannel formed by grooves in the two substrates. *Id.*

Claims 8-13 were rejected in further view of *Lough* or *Smith*, which were relied on as described in the previous subheading.

Applicants traverse for at least the following reasons. As described above, *Quake*, *Lough*, and *Smith* all three fail to disclose a microchannel having an inner wall surface decorated with triethylchlorosilane, as recited in claim 1. *Zenhausern* also fails

to disclose this aspect of the claim. Accordingly, because the Office has not established that these four references, either alone or in combination, disclose or otherwise render obvious every aspect of the claims, Applicant respectfully requests the rejection be withdrawn.

C. Zenhausern and Quake in view of Wilding and/or Murphy

Claims 14, 15, and 19-20 are rejected under § 103(a) as obvious over *Zenhausern* and *Quake* in view of United States Patent No. 5,587,128 to *Wilding* (*Wilding*) and/or United States Patent No. 6,743,516 to *Murphy* (*Murphy*). Office Action at p. 11. The Office applies *Zenhausern* and *Quake* to claim 1 as described above. Additionally, the Office alleges that *Zenhausern* and *Quake* both disclose chlorosilane surface treatment agents, and that *Quake* further discloses the use of hydrophobic coating, because it discloses TEFLON(R) as a possible surface treatment agent. *Id.* The Office concedes that neither *Zenhausern* nor *Quake* discloses a trialkylchlorosilane surface treatment agent, as recited in the claims. *Id.*

For this aspect of the claims, the Office turns to *Wilding* and/or *Murphy*. Regarding *Wilding*, the Office alleges that reference discloses coating microfluidic channels with trimethylchlorosilane. *Id.* Regarding *Murphy*, the Office alleges that reference discloses trimethylchlorosilane and triethylchlorosilane as highly durable hydrophobic coatings. *Id.*

Applicants note that, although claims 14 and 15 have been canceled, the limitations of claim 15 have been incorporated into presently amended claim 1. Thus,

Applicant addresses these rejections below; to the extent they apply to presently amended claim 1. Applicants traverse the rejection for at least the following reasons.

The Office bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. See M.P.E.P. § 2142. In *KSR Int'l Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385 (2007), the Supreme Court confirmed that the “framework for applying the statutory language of §103” is still based on its landmark decision in *Graham v. John Deere Co. of Kansas City*, 148 U.S.P.Q. 459 (1966). Under *Graham*, four factors are considered when determining whether an invention is obvious: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) secondary considerations, including any unexpected results. 148 U.S.P.Q. at 467. Implicit in this analysis is the requirement that the Office show that each and every element of the claims is disclosed in the prior art. M.P.E.P. § 2143.03.

As articulated in *KSR*, part of this evaluation involves determining “whether there was an apparent reason to combine” the prior art elements relied upon to establish obviousness. 82 U.S.P.Q. 2d at 1369. Thus, the Examiner must show that there was a reason why one of skill would modify a prior art reference asserted under § 103 in order to reach the claimed invention. In particular a person of ordinary skill in a particular art is not likely to know about prior art in different and unrelated fields of technology. Thus, to make a Section 103 rejection, the reference must qualify as “analogous” prior art. M.P.E.P. § 2141.01(a).

Applicants initially note that the present disclosure teaches that decoration of a wall of a microchannel with the compounds of the present invention, such as

triethylchlorosilane as recited in claim 1, advantageously prevents the buildup of dust, which impairs microchip sensitivity and performance. See, e.g., paragraphs [0043]-[0045] of the published application. The problem of dust is particularly pernicious for microchannels, which, unlike flat surfaces, cannot be easily washed out. See *id.*

Regarding *Wilding*, Applicants note that the reference does not disclose or suggest the use of triethylchlorosilane in anyway. Thus, the combination of *Zenhausern* or *Quake* with *Wilding* fails to lead the skilled artisan to the claimed invention.

Moreover, *Wilding* is silent with respect to the particular problems associated with decoration of an inner wall surface of a microchannel, such as dust buildup. Indeed, *Wilding* suggests the use of dichlorodimethylsilane for the decoration of the surfaces of a microchip channel. In the present disclosure, Applicants note that dichlorodimethylsilane may lead to formation of dust, because it leads to the unwanted “production of polymers” and “the polymerization of the molecules cannot be completely prevented.” Paragraph [0043]. Thus, *Wilding* fails to provide any reasonable expectation that use of triethylchlorosilane would lead to the surprising result of decreased dust formation. For at least these reasons, Applicants respectfully request the withdrawal of the rejections over *Zenhausern* and *Quake* in view of *Wilding*.

Regarding *Murphy*, the Examiner has not explained why a skilled artisan working in the technical field of the present invention, nucleic acid extraction on a microchip, would have looked to *Murphy* for any guidance. Applicants note that *Murphy* is directed to providing hydrophobic treatment to glass substrates generally, such as glass used for automobile windows. The reference makes no mention of treating a microchip, much less an inner wall surface of a microchannel, as recited in the present claims. Nor does

*Murphy* mention extracting nucleic acid in anyway. Thus, the skilled artisan would have had no reason to look to *Murphy* as a reference pertinent to the present invention.

Moreover, even if the skilled artisan looked to *Murphy*, she would have had no basis for expecting the modification of *Zenhausern* or *Quake* with *Murphy* to lead to successful treatment of the inner wall surface of a microchannel. In particular, *Murphy* appears to be directed to flat glass substrates, and does not address the specific challenges associated with the decoration of a surface of a microchannel, such as dust buildup. For at least these reasons, Applicants respectfully request withdrawal of the rejection of the claims over *Zenhausern* and *Quake* in view of *Murphy*.

**CONCLUSION**

In view of the foregoing remarks, Applicants submit that this claimed invention, as amended, is neither anticipated nor rendered obvious in view of the prior art references cited against this application. Applicants therefore request the entry of this Amendment, the Examiner's reconsideration of the application, and the timely allowance of the pending claims.

Please grant any extension of time required to enter this Amendment and charge any additional required fees to Deposit Account 06-0916.

Respectfully submitted,

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